Good Morning

- Please take out your notebook and something to write with.
- In your notes: Write the balanced equation for Beryllium Iodide.

Please take a handout from the front desk.

Homework

- Due Thursday
- From Tuesday's Class: 3-7, 10, 11, 14, 16, 18, 20, 22, 41, 43, 46.
- From Wednesday's Class: 23, 25-27, 29, 48, 51

This week:

T: 7.1 and 7.2

W: Ionic compounds lab and intro to metallic bonding.

R: Finish Metallic bonding. Copper nitrate and aluminum foil lab.

F: Retake and make up day.

Chapter 9 Quiz:

We will divote a little bit of practice to each kind of compound each day this week.

Please take a look at the handout with the steps for determining the name of a compound.

Ionic compounds:

Is there a metal?

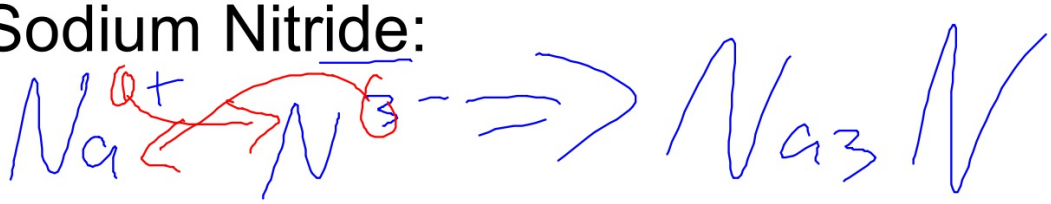
Does it have more than one possible charge?

What are the charges on the cations and anions?

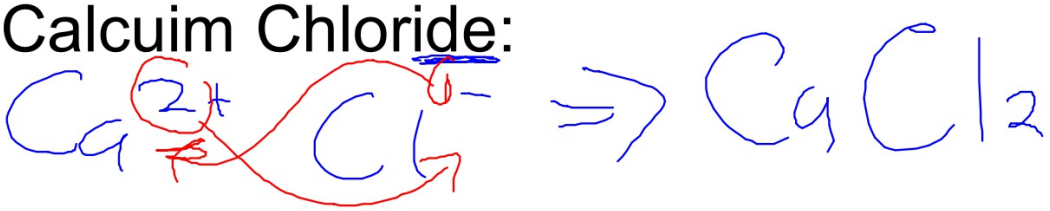
How can you balance the charges?

Examples:

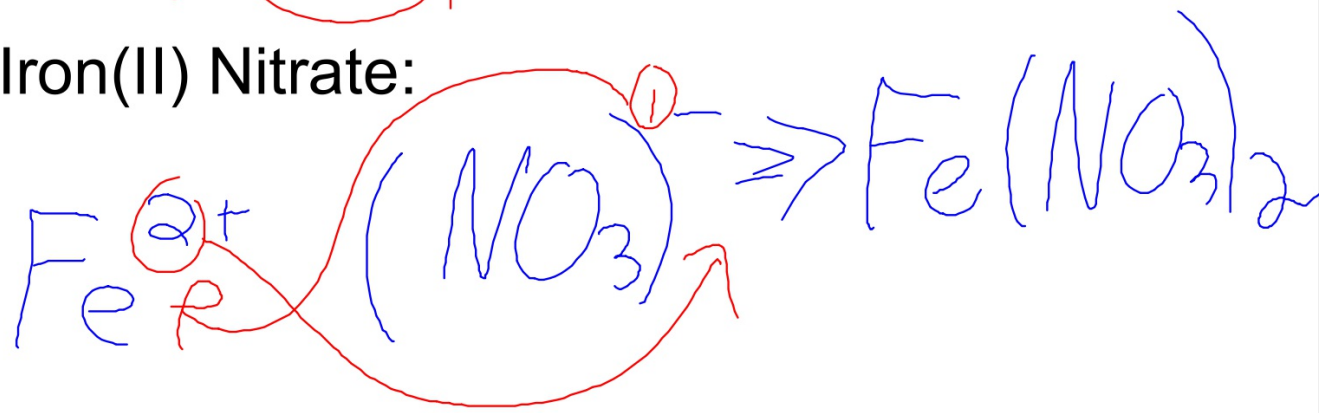
Sodium Nitride:

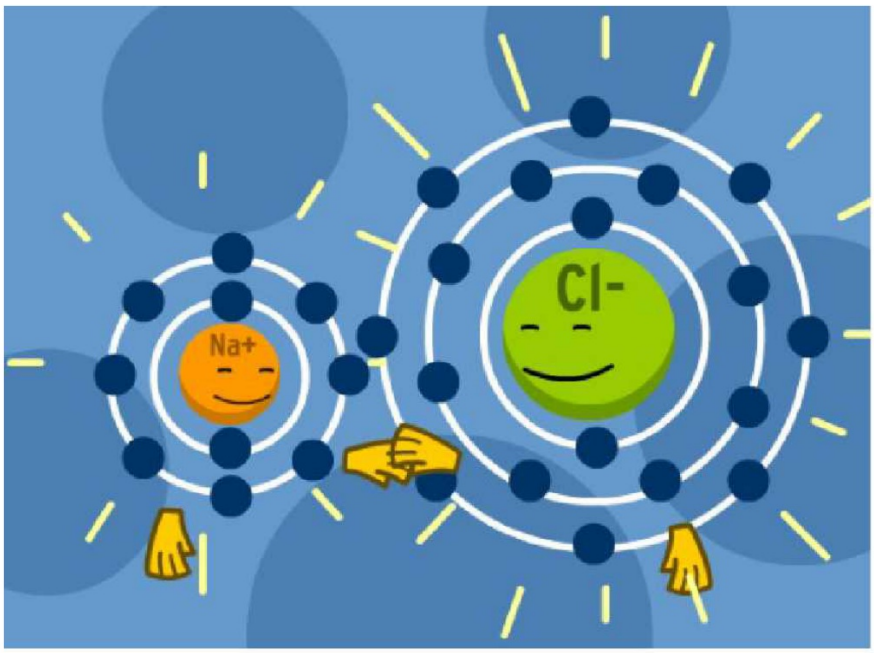


Calcuim Chloride:



Iron(II) Nitrate:





Chapter 7: Ionic and Metallic Bonding

7.1 Ions

- Valence Electrons
- The octet rule
- Formation of anions and cations

Recalling PTE Organization

- Mendeleev used similar properties of elements to organize his periodic table of elements.
- Later, scientists discovered that elements with similar properties have similar electron configurations.

Valence Electrons

- The number of electrons on the highest energy level.
- These are on the outer "shell" of the atom.
- The valence electrons are the largest contributor to chemical properties of elements.

Determining Valence Electrons

- If they are in the s or p blocks, use the number the precedes A at the top of the column (group).
- We can represent them with Lewis Dot Structures.

Groups and Valence e-: Write the charge and an example of the Lewis Structure.

4th Period

- Alkali Metals: K
- Alkaline Earth Metals: Ca
- Boron Group: Ga
- Oxygen Group: Se
- Halogens: Br

Noble Gases

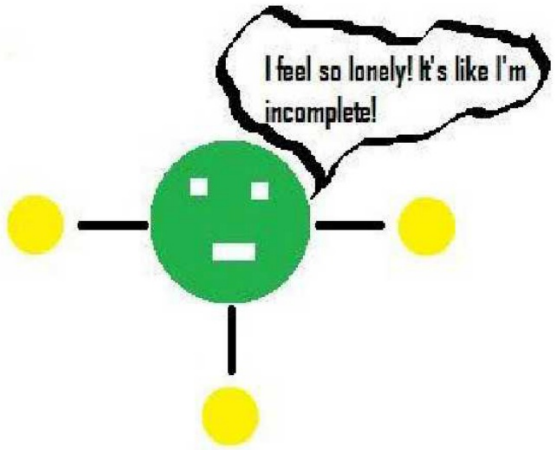
- Full Valence shell.
- Elite 8. Everyone wants to be a noble gas.
- Exception: Helium. Helium has a full shell at 2 valence electrons.

Mr. Lewis

- Gilbert Lewis (dot structure creator) was the first to say that chemicals (atoms) bond in order to get the e- configuration of a noble gas.

Octet Rule

- All atoms bond to get 8 electrons.
- This fills the valence shell.



Ions Review

- Metals generally lose electrons and become positively charged cations.
- Non-metals generally gain electrons to become negatively charges anions.

Note that Ion

- Sodium: Na^{+}
- Sulfur: S^{2-}
- Rubidium:
- Iodine:
- Aluminum:
- Lead (IV):
- Lithium:
- Tellurium:
- Calcium:
- Osmium:

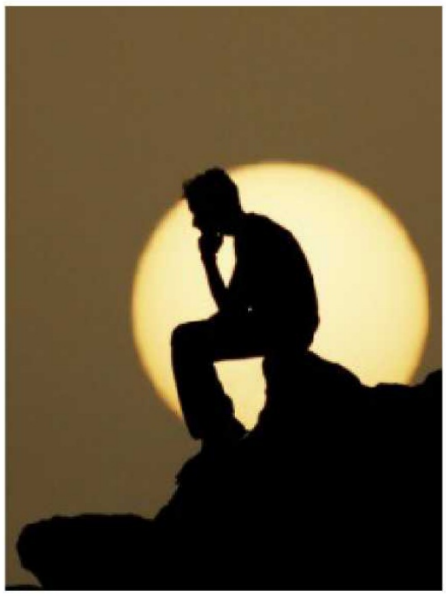
Polyatomic Ions

-ite or -ate

- These ions have net negative charges.
- They will behave similar to elements with similar charges when reacting (bonding) with other chemicals.

Thinking Deeper

- What happens when metals give their e- to non-metals?
- How do these ions behave when they have opposing charges?



7.2 Ionic Bonds and Ionic Compounds

- Charges in ionic compounds.
- Properties of ionic compounds.

Composition of Ionic Compounds

- Composed of cations and anions.
- Generally metals and non-metals.
- We can figure out the composition by balancing the charges.

Balance the Charges

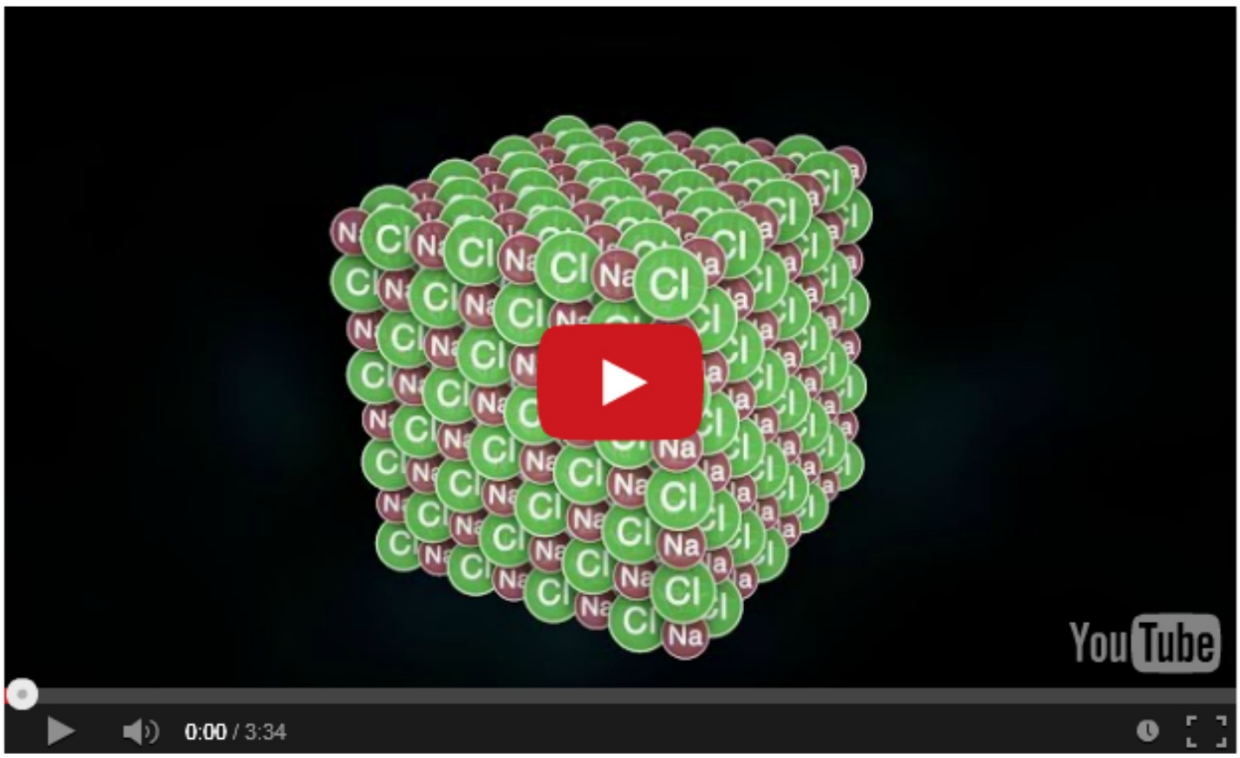
- Write the balanced chemical formula.
- Sodium Chloride:
- Calcium Fluoride:
- Ammonium Nitrate:

Chemical Formulas

- Shows the kinds of elements and their number in a compound.
- Subscripts denote that the chemicals are bonded together.
- Only describe a ratio of chemicals, **not** a single unit of a compound.

Example

- Magnesium Bromide: $MgBr_2$
- Number of Magnesium ions: 1
- Number of Bromide anions: 2
- This is only a ratio or pattern, not the amount of Magnesium Bromide present.


Cl
Na
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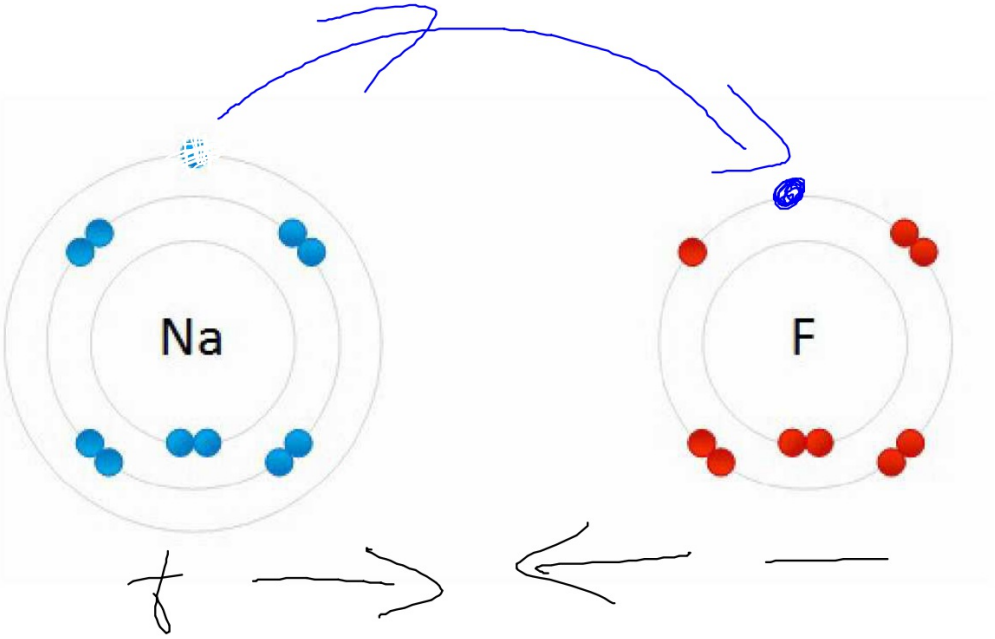
Formula Units

- Smallest whole number ratio of ions in a compound.
- These are basically the chemical formula.
- The units (numbers) note the ratio of ions in the compound.

How Ions Combine

- Elements want to get to 8 valence electrons.
- Metals give their ions to non-metals.
- The elements now have opposing charges.
- Opposites attract.



Example

Properties of Ionic Compounds

- Ionic bonds are strong compared to other kinds of bonds.
- This is due to the opposing charges of the ions.

Shapes of ionic compounds:

The formula units determine how crystalline structures will form.

Look at NaCl.

Microscopes:

Get a microscope for you lab bench.

Put a few (only need a small pinch) grains of salt onto a slide.

Look at it under 4x and 10x magnification.

Draw what you see on a whiteboard with your lab partner.

Electrostatic Forces

- Ions have an imbalance of protons and electrons.
- This leads to a net charge.
- The attraction of opposing charges leads to strong bonds.

Properties of Ionic Compounds

- Most are crystalline structure at room temp.

Crystalized Salt

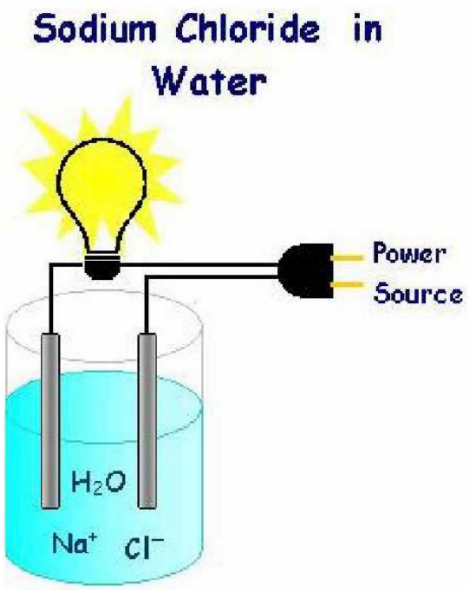
- We all need salt to live, but we take little time to think about what it really looks like.
- You may know that salt looks like a other crystals, but have not seen their exact shape.

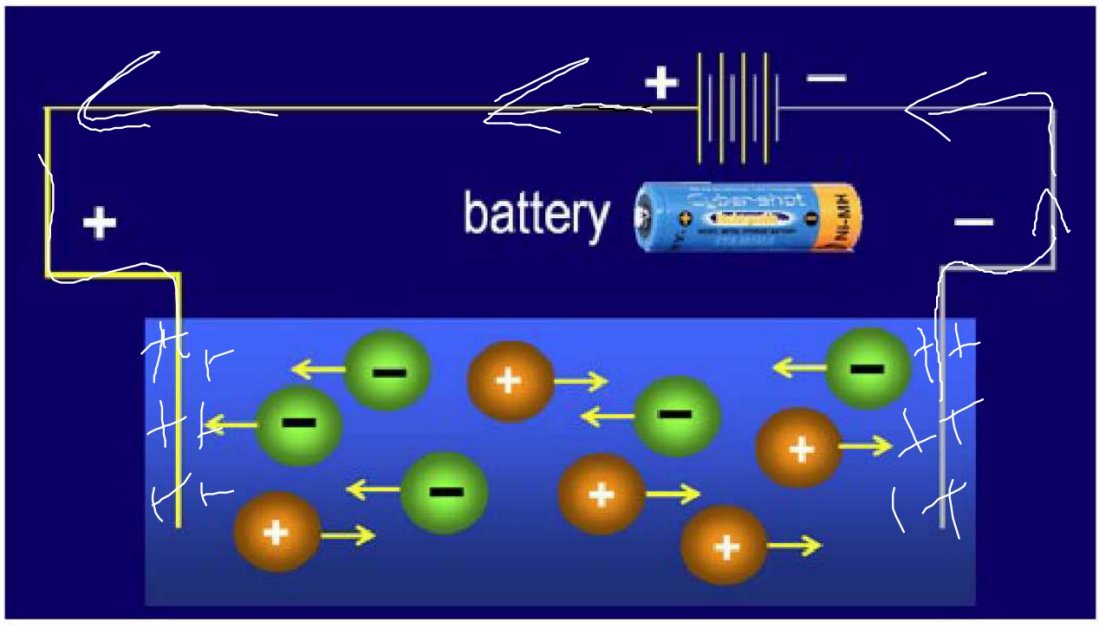
Properties of Ionic Compounds

- Generally have high boiling and melting points compared to other compounds.

Properties of Ionic Compounds

- When in **solution**, ionic compounds conduct electricity.





A Closer Look

Illustrations

- Draw the interaction that happens when electrodes are places in a solution containing an ionic compound.
- Present your drawing to the other group at your lab table.

Ionic compounds are brittle.

- Charges alternate in ionic crystalline structures.
- What happens when you try to move a column up or down?

Good Morning:

Please take a handout from the front table.

Get out a pencil and your periodic table of ions.

You will notice that there are samples of ionic compounds on each of your desks.

Find the compound that is at your station and circle it on your data sheet.

Today: Identifying ionic compounds.

You will move around to 16 different stations around the room with your lab partner.

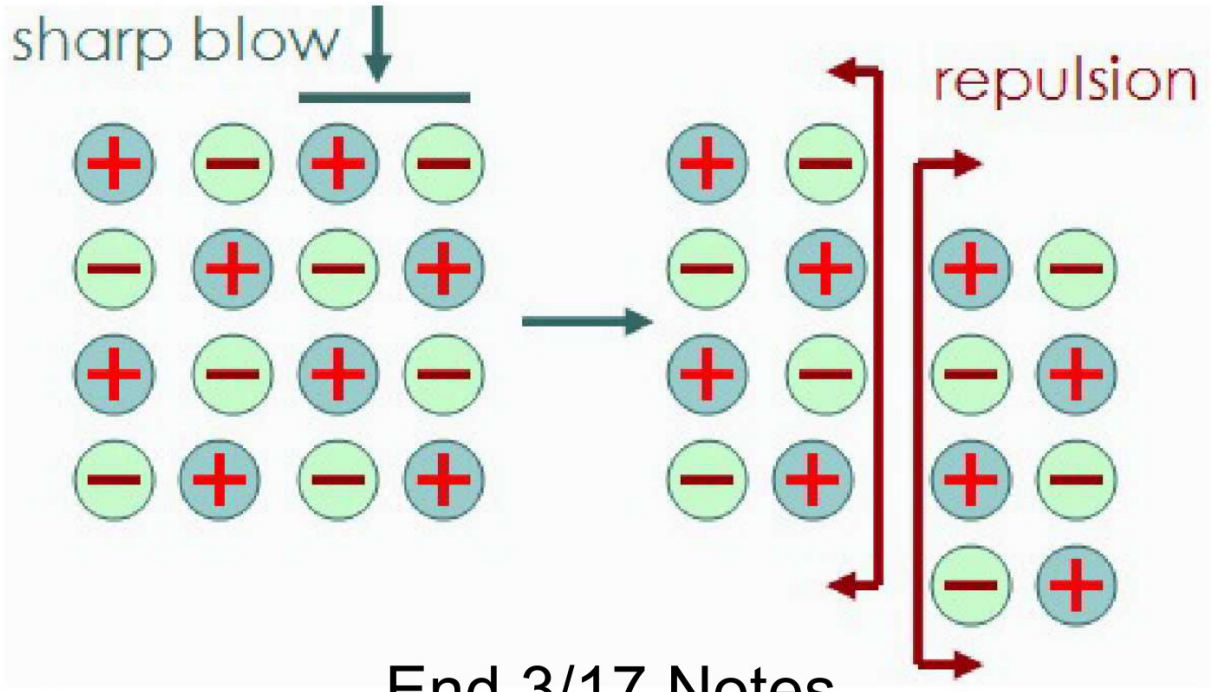
At each station you will identify the ionic compound, write the balanced equation for the **formula unit**, and describe the colors of the compound.

You will have 2-3 minutes at each station.

Back where you started?

Look at the patterns for the colors of different ionic compounds.

Based on these patterns, name the color of each ion. When you are finished, put your lab sheet in your lab folder.



End 3/17 Notes

Illustration

7.3 Metallic Bonding

- Valence electrons in metal atoms.
- Arrangement of atoms in a metal.
- The importance of alloys.

What's a Metal?

- If I asked someone on the street to name a metal, what would some of their answers be?

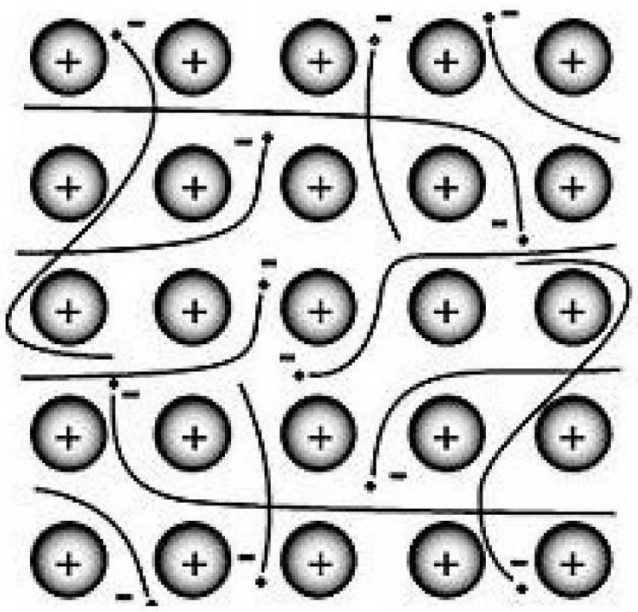
Iron, Tin, Titanium, Gold, Platinum, Copper, Lead, Nickel silver

Valence Electrons

- What we think of as a "regular" metal is generally a transition metal.
- These metals generally have 2 valence electrons.
- What do these atoms do to become neutral?

Sea of Electrons

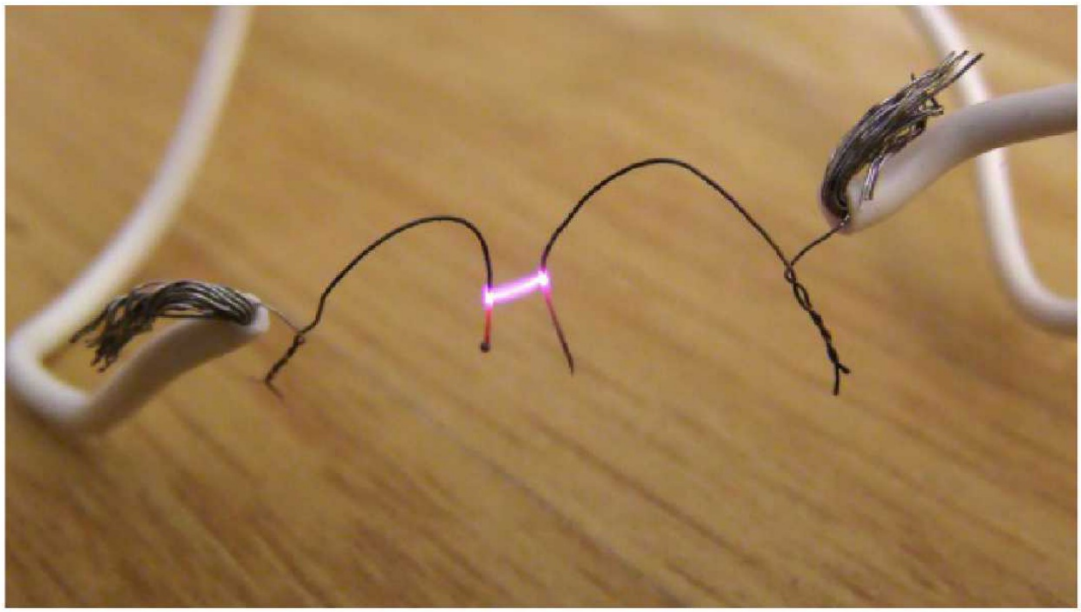
- When metals are all packed together, they all want to lose 2 electrons.
- All of these cations are packed together.
- Where do their electrons go?



Sea of Electrons

Stay Close

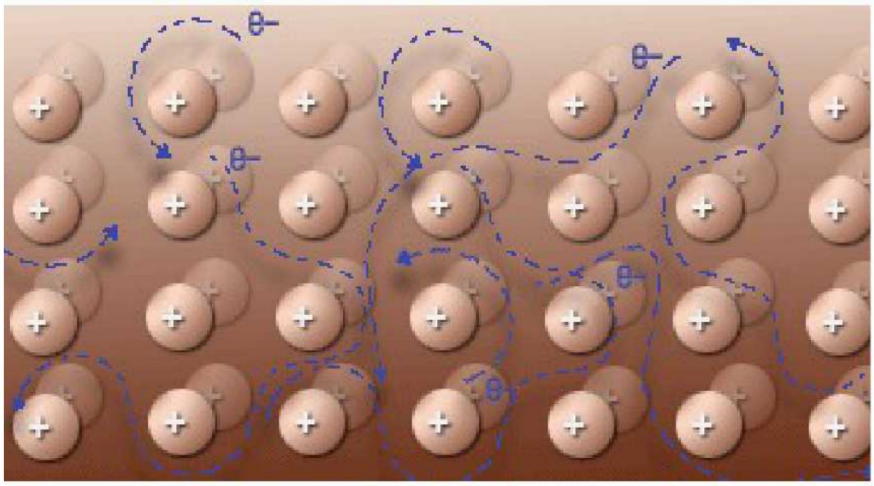
- A metal loses 2 electrons and gets a positive charge.
- It is now attracted to the electrons moving around it.
- This keeps the metals from breaking away from the sea of electrons.



Properties: Conductors

Conduction in Metals

- The free electrons in metals are repelled by electricity (negative charge).
- The electrons migrate away from the charge and bring a similar charge to the other side of the metal.

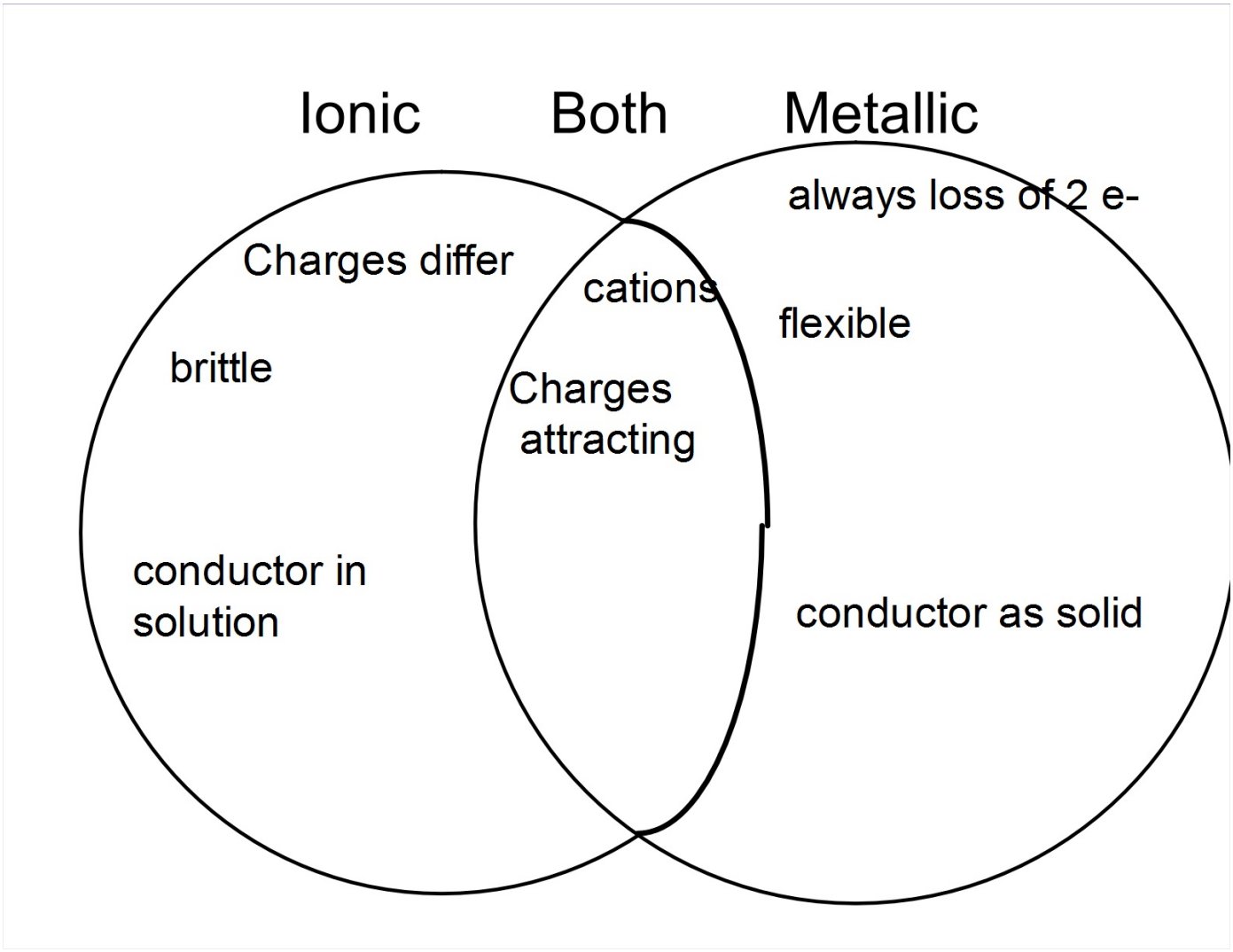


Illustration

You Present

- Draw a representation of a metallic bond.
- Present your picture to the other group at your lab table.
- Explain why metals make good conductors.

Make a Venn diagram comparing and contrasting ionic and metallic bonding.


Ionic
Both
Metallic
always loss of 2 e-
Charges differ
cations
flexible
brittle
Charges
attracting
conductor in
solution
conductor as solid

Good Morning!!!

Please take a handout from the front desk.

Grab goggles for you and your lab partner.

Begin reading over the lab for today.

Take out the homework and check it with the answers by the chem hood.

Copper(II) Chloride and Aluminum foil.

Materials: 50ml beaker, wash bottle (to be shared between a lab bench, glass stirring rod, piece of aluminum foil slightly larger than a quarter.

Later, you will measure out a half a pea sized scoop of Copper(II) Chloride.

Take the dry 50ml beaker to one of the bottles of copper(II) chloride on either side of the room.

Put the 1/2 a pea sized sample of copper(II) chloride into the beaker and return to your lab station.

Once there, use the wash bottle to add about 25ml of deionized water to the beaker. Stir with stirring rod until all the powder is dissolved.

Place the aluminum foil into the solution. Do not crumple it into a ball. Leave it mostly flat.

Gently use the glass stirring rod to push the foil to the bottom of the beaker. This only needs to be done once. Do not stir the solution once the foil is in the beaker.

Observe what happens to the foil. Record your observations and begin answering the questions at the bottom of the lab sheet.

Finished answering the lab questions?

Complete the back of the lab sheet.

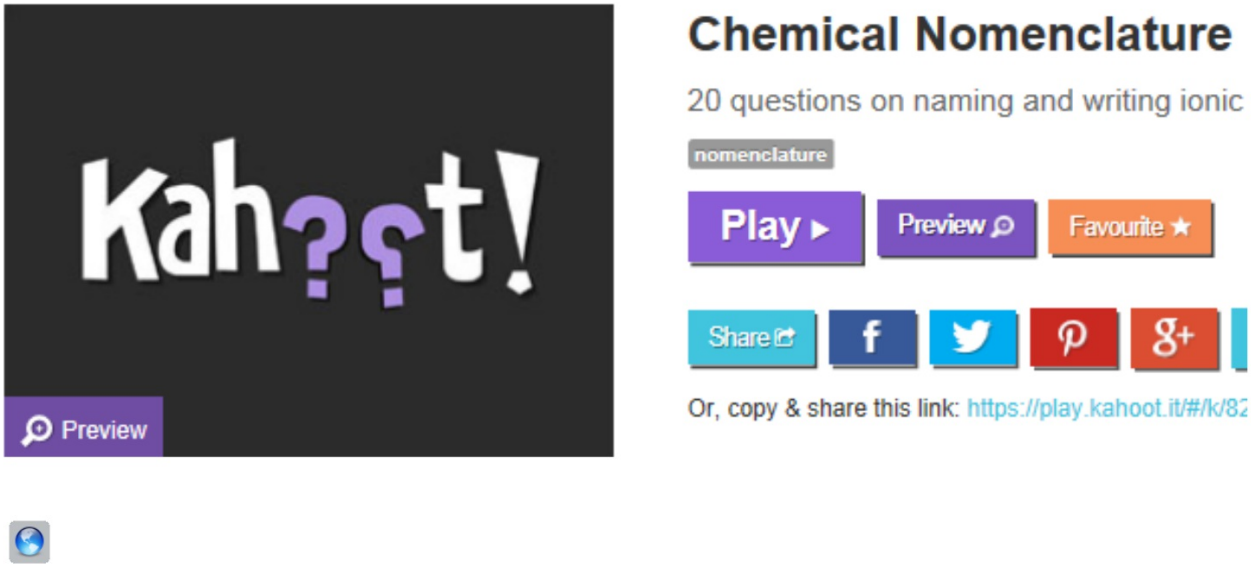
Put the lab in your folder and get a naming compounds review sheet. Use your periodic table of ions and the naming organizer that you have.

Work on the sheet and I will be around to answer questions.

The answer key is on school wires.

Is there a metal?
y-ionic compound. No numerical prefixes.
n-molecular compound. Yet to numerical prefixes.

Ionic: write the symbol and charge of the cation and anion. Swap the charges for each ion to get the number of ions needed.


Kahoot!
Preview
Chemical Nomenclature
20 questions on naming and writing ionic
nomenclature
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Preview
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Share
Or, copy & share this link: https://play.kahoot.it/#/k/82

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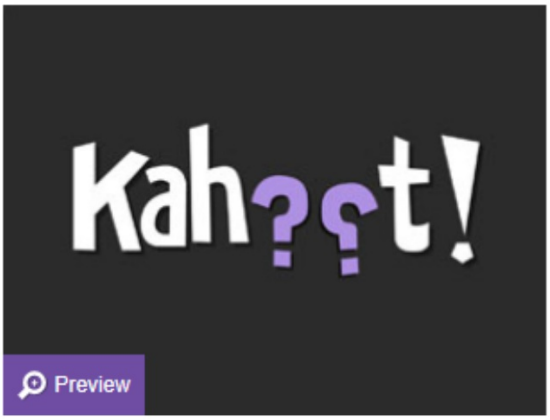
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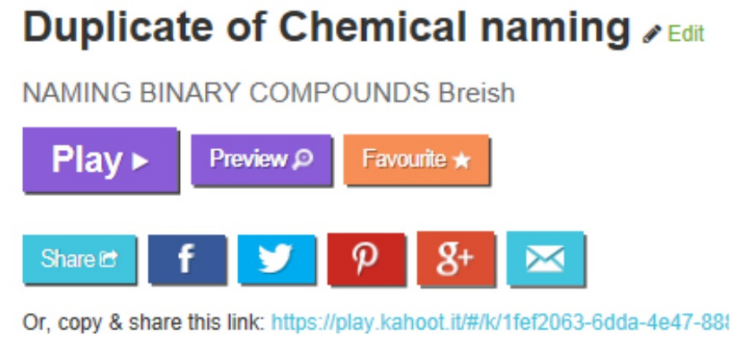
Preview


Duplicate of Chemical naming
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NAMING BINARY COMPOUNDS Breish
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Kahoot.it

Metals continued:

Please take out your notebooks and open to where we left off yesterday (metallic bonding).

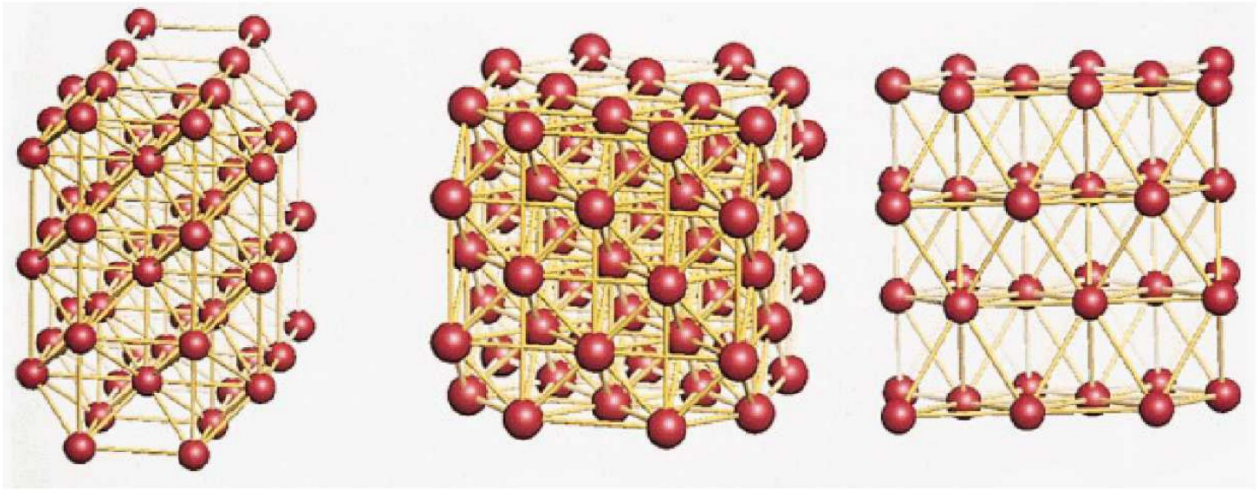
Ductile

- Metals can be molded into wires.
- This is because the cations can remain stable when we move them through the "sea of electrons."
- Why wouldn't this work in ionic compounds?

Structure

- Metals are tightly packed.
- The optimize space and form crystal-like structures.

Silver



Metallic Crystal Structures

Alloys

- A mixture of 2 or more elements.
- Very few of the metals that we use are pure metals.
- Because pure metals are ductile, they may be weaker.
- Adding other elements polarizes crystalline structures.

Examples

- Sterling Silver: 92.5% Silver, 7.5% Copper.
- Cast Iron: 96% Iron, 4% Carbon.
- Stainless Steel: 80.6% Fe, 18.0% Cr, 0.4% C, 1.0% Ni.

Percent Mass:

If compounds have the same composition, the percent mass of the compound should be the same all the time.

We can also work backwords to see what the formula of a compounds is based on its percent mass.

Methane: CH_4

One carbon atom and 4 hydrogen atoms.

A compound is found to contain 74% Na and 26% O. What is the formula unit for the compound?

A compound is found to have 30.4% nitrogen and 69.6% oxygen. What is the formula for this compound?